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**AUTOMATIC PATTERN RECOGNITION
DURING THE PERIOD 1961-1962:
AN ANNOTATED BIBLIOGRAPHY**



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Compiled by
Eugene E. Graziano

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MAY 1963

Work done in support of LMSC Independent Research Program

Lockheed

MISSILES & SPACE COMPANY

A GROUP DIVISION OF LOCKHEED AIRCRAFT CORPORATION

SUNNYVALE, CALIFORNIA

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ABSTRACT

One hundred and forty references on all aspects of automatic pattern recognition for the period 1961-1962. Included are references pertaining to theory and experience with systems, components, methods, optics, speech, etc.

The period covered in the search was January 1961 - December 1962.

Search was completed in January 1963

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Description of a circuit for formant tracking in speech recognition.

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OF PATTERN RECOGNITION. Stanford Research
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109p. (Contract Nonr-343800) ASTIA AD-275 352.

A machine for recognizing patterns may be considered to consist of a receptor and a categorizer. The receptor views the pattern and translates its features into machine language. The categorizer classifies the pattern using the information supplied to it by the receptor. In this paper information extracted from a visual pattern by receptor is required to be invariant with respect to the rotation and the translation (and at times, scale changes) of the pattern. We thereby obtain numerical parameters from the pattern that corresponds to the shape of the pattern. Integral geometry is employed to obtain these variant parameters. Probabilities of error are found as a function of the number of pattern measurements which are used to estimate a parameter. The numerical values of some parameters are obtained for the set of patterns consisting of circles, squares, rectangles, ellipses and right isosceles triangles. In addition, decision theory is used to obtain the structure of the test having minimum probability of error.

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Solving registration problems in optical character recognition. ELECTRONICS 35: 77-81,
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Improvements are reported in the memory matrices of the n-tuple pattern recognition method that consist of selecting more optimum matrices than the 0, 1 type.

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Given a set of measured characteristics for an unknown object, it is desired to assign this object to a class. A theoretical model and its application show that the requirements for a set of parameters to be used as inputs are not as rigid as originally assumed. It is shown that a less-qualified set of measured inputs can be used to induce an expanded set which combines both natural (measured) and artificial parameters. The expanded set allows the effective definition of a recognition function regardless of whether or not the original measurements encoded are sufficient in themselves to provide the completed recognition model.

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A "logical pattern" recognition program. IBM
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An IBM 7090 program is described for searching out logical patterns from sets of input data.

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Several lines are discussed concerning the use of autocorrelation functions for character recognition.

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Optical scanning in the field. DATA PROCESSING 4: 15-17, July 1962.

Stroke analysis in character recognition is the practical approach as verified by various experiences.

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The pattern recognition problem is composed of two subproblems. First abstracting significant characteristics from the patterns being dealt with. The second identifying the pattern. Discussed is a special purpose digital computer, which simulates a network of threshold elements designed to correctly identify a preselected set of typical patterns. In addition to describing the design procedures, methods of feature extraction, and the hardware employed, the results of experiments involving several thousand hand-written characters are presented.

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A fast numeral reading machine. ELECTRONIC ENGRG 33: 562-573, Sept 1961.

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Computer identification of vowel types.
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Description of a coordinate transformation system which simplifies vowel boundary determination from experimental data on vowel formant frequencies and voice pitch.

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Computer synthesis of character recognition
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Description of a logic simulation program that was run in the IBM 704 to verify character recognition procedures.

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A SYSTEMATIC METHOD FOR CHARACTER
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1222-4, 15 Nov 61, 56p. (Contract AF 33(616)
6137). ASTIA AD-268 360

A technique for character recognition is described such that: (1) each character is representable by a unique mathematical expression; (2) the recognition technique is independent of character size; (3) the technique is independent of character orientation; and (4) the gross features of a character are identified by using only a limited number of terms of the mathematical expression. The principal disadvantage of the technique is that it is sensitive to irregularities or distortions of standard figures. The technique is considered feasible for the recognition of typed letters or numbers, where the figures are distinct and are identical for each appearance.

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of Electrical Communication Engineers of Japan,
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Characters are projected onto photosensitive strips arranged in lattices. Parameters of each strip are functions of the character image.

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COMPUTER J., 4: 129-136, July 1961.

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Speech recognition: a model and a program
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Optical character recognition system.
DATA PROCESSING 4: 22-26, July 1962.

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An experimental device is described which can recognize handwritten numerals.

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A practical system consisting of commercially available components is described for pattern recognition.

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IRE TRANS ON ELECTRONIC COMPUTERS.
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June 1962.

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IRE TRANS. ON ELECTRONIC COMPUTERS,
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Pattern recognition by moment invariants.
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IRE TRANS. INFORMATION THEORY, IT-8:
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Announcement of an optical character reader marketed by IBM.

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USING A SIEVING METHOD. Professional Group on
Automata and Automatic Control of the Institute of
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A discussion of the "sieving method" as an approach to pattern recognition.

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SIMULATION OF TEACHING AND LEARNING OF
AN ACTIVE SPEECH RECOGNIZER. Professional
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 June 23, 1961.

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 3008123, 7 Nov. 1961.

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A multi-channel magnetic transducer assembly is presented which may be used in sensing magnetic ink characters.

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 MAGNETIC CHARACTER RECOGNITION.
 U.S. P. 3030014, 17 April 1962.

A description of magnetic heads for sensing characters printed in magnetic ink.

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 CHARACTER RECOGNITION. U.S.P.
 3025495, 13 March 1962.

Arrangements for more simple scanning in optical pattern recognition are described.

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 A note on learning signal detection, IRE TRANS.
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Autocorrelation pattern recognition. PROC.
IRE, 49: 1085-1086, June 1961.

A letter concerning the use of autocorrelation in pattern recognition. Experiments using the TX-0 computer are outlined.

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SOME METRIC CONSIDERATIONS IN PATTERN
RECOGNITION. Air Force Cambridge Research
Labs., Bedford, Mass. Rept. no. AFCRL-327, 44p.
July 1961.

Speculation about machines which might learn to recognize visual patterns but which would be randomly wired are analyzed, and it is shown that at least certain mild constraints of a distance-ordering sort must be imposed upon random connections.

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ON ELECTRONICS COMPUTERS, EC-10: 489-501,
Sept. 1961.

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AN INTRODUCTION TO THRESHOLD DEVICES
AND THEIR USE IN PATTERN RECOGNITION.
New York U. Coll. of Engineering, N. Y.
Technical rept. no. 400-44, Aug. 61, 68p.
(Contract AF 49(638)586, Proj. 9768)
AFOSR-2414. ASTIA AD-281 760

Introductory concepts of switching logic by threshold devices, and examples in pattern recognition applications. A threshold device realizes a given function by: (1) forming a weighted linear sum on the binary inputs plus a threshold number; and (2) forming a binary output whose value is determined by the value of this sum. The complement

of a single variable, the AND and the OR functions of any number of variables can be realized by a single threshold device. A necessary condition for realizability by a single threshold device is that the function be completely monotonic.

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Finite automata, pattern recognition and perceptrons.
J. ASSOC. COMP. MACH. 8: 1-20, Jan. 1961.

Pattern recognition logic is developed together with a number of theorems in terms of set theory.

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Spectrographs identify human voice patterns.
INTERNATIONAL ELECTRONICS 4: 20-21,
Aug 1962.

It is proposed that voice spectrograms could be used for identification of individuals with the aid of computer analysis.

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PROBLEMS IN THE DESIGN OF A SCANNING
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(Foreign Developments in Machine Transl.
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Comput. Eng., Acad. Sci. U.S.S.R. No. 2,
Moscow, 1961, 447p.

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ON THE ELEMENTAL NATURE OF FUNDA-
MENTAL FREQUENCIES GOVERNING SPEECH
QUALITY. Professional Group on Information
Theory of the Institute of Electrical Communica-
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Tokyo, Japan. June 24, 1961.

83. (contd) Fundamental frequencies of speech were analyzed and were found to be important to the quality of naturalness.

84. Laemmel, A. E.
MACHINE LEARNING PROCESSES APPLIED TO
PATTERN RECOGNITION. Microwave Research
Inst., Polytechnic Inst. of Brooklyn, N. Y. Final
rept., 14 Dec 61, 39p. Rept. no. PIBMRI-981-61
(Contract AF 19(604)6154)AFCRL 62-6. ASTIA
AD-282 549.

The theories of the principal three methods for pattern recognition are summarized. Calibration from a sample set of patterns; derivation of numerical properties; and a decision process for determining the class of a pattern. Several mathematical processes are suggested for finding useful properties, including equations which define invariants to acceptable distortions. It is shown that if an efficient and consistent decision process is used, then the property search is easier since the addition of useless or redundant properties cannot degrade the performance.

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Recognition of handwritten characters,
B. P. 863431, 22 March 1961

A device is used to identify handwritten numerals by the actuation of different circuits for each direction of movement.

86. Larkin, W. D., et al.
SPEECH-TO-CODE CONVERTER STUDY.
General Dynamics/Electronics, Rochester, N. Y.
Final rept. 1 July 1959-31 Dec. 1960. 30 Sept 1961,
149p. (DA 36-039-sc-78908) ASTIA AD-272 109.

An experimental study was made to determine the necessary parameters for the identification of words spoken in isolation. Several approaches were demonstrated to be sound.

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Design factors in the development of an optical
character recognition machine. IRE. TRANS.
INFORMATION THEORY. IT-8: 167-171,
Feb. 1962.

On the development of the IBM 1418 Optical Character Reader, and includes a general discussion of the basic design factors to be considered in the design of optical readers.

88. Leland, H. R.
PERCEIVING AND RECOGNITION AUTOMATA.
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
Annual rept. on Project PARA, 1 Jan - 31 Dec.
1961. 31 Dec 1961. 19p. (Nonr-238100) ASTIA
AD-272 245.

A perceptron and a computer were used in system to ascertain their abilities to recognize imperfect, mixed-font printed characters.

89. Letters, symbols, punctuation read.
DATAMATION 7:(3) 25, March 1961.

An announcement of Farrington's alphabetic page reader. This fully transistorized device is capable of reading and recording up to 300 upper case letters per second.

90. Lewis, P. M.
The characteristic selection problem in recognition
systems. IRE TRANS. INFORMATION THEORY, IT-8:
171-178, Feb 1962.

An extensive discussion of statistical recognition systems, and necessary experiments to best apply such methods.

91. Lumpkin, C., and C. E. Newcomb
High-speed character recognition. IBM
TECHNICAL DISCLOSURE BULL., 5: 37-38,
Sept. 1962.

91 (contd) Circuitry is described that codifies video signal output from a scanner for use in recognition.

92. Martin, T. B. and J. J. Talavage
SPEECH PATTERN RECOGNITION BY
SIMULATED NEURAL NETWORKS. RCA
Defense Electronic Products, Camden, N. J.
Interim rept. no. 1, 1 Dec 61 - 1 May 62, 1 July 62,
48p. (Contract AF 33(657(7405, Proj. 4335)
ASD TDR 62-511, ASTIA AD-277 200.

A summary of the physiology of hearing including information on the middle ear, inner ear, and the intermediate levels up through the acoustic cortex; neural responses from these levels are described. The authors are using this information to guide the design of a speech recognition system using neural networks. Electrical models are described, and aspects of the performance of the models are compared with known psychoacoustic data on threshold of hearing, masking and critical bandwidth. A "neural transition AND gate" is described which abstracts time transitions of energy as they occur in the speech patterns. A final report will be issued describing the performance of the system when using speech inputs.

93. Mattson, R. L.
AN APPROACH TO PATTERN RECOGNITION
USING LINEAR THRESHOLD DEVICES.
Lockheed Missiles and Space Co., Sunnyvale,
Calif. Technical Report on Mathematics, LMSD
702680. Sept. 1960, 31p. ASTIA AD-246 244.

Pattern space, data space, and classification space are the three fundamental spaces to be considered if the problem of pattern recognition is to be represented as a mapping problem. Equipment is proposed and examples are given in the utilization of this approach.

94. Meeker, W.F. and L. S. Green
VOICE TO TELETYPE CODE CONVERTER
RESEARCH PROGRAM, PART I. EXPERI-
MENTAL VERIFICATION OF A METHOD TO
RECOGNIZE PHONETIC SOUNDS. Radio Corp.

- 94 (contd) of America, Camden, N. J. Dec. 1961. 125p.
(AF 33(616)6691, Proj. 4335) ASD TR 61-666,
Pt. 1. ASTIA AD-272 024.

Eventual development of a speech to teletype code converter requires basic information relating to automatic speech recognition. In general, the phoneme was taken as the basic speech unit, but a number of instrumental approaches were attempted.

95. Melpar, Inc., Watertown, Mass.
APPLICATION OF RECOGNITION-THEORY TO
MISSILE IDENTIFICATION AND DECOY DISCRIMINATION, v. 2, semi-annual report no. 2, 30 Jan 1962. 140p. (AF 30(602)2420, Proj. 4983). ASTIA AD-273 241.

The nine sections of this report each discusses some aspect of the pattern recognition problem; approximate decision techniques; variant form analysis; representation; and forms of testing.

96. Merry, I. W. and G. O. Norrie
Character quality and scanner organization.
COMPUTER J. 4: 137-144, July 1961.

The many variables that relate to quality in scanning systems which employ a mapping on a binary matrix are discussed.

97. Michigan University, College of Lit., Sci., and
the Arts, Ann Arbor. A THEORY OF ADAPTIVE
SYSTEMS. Quarterly Progress Report no. 2,
1 Feb. - 30 Apr 1961. June 1961. 2p. Report
no. 04274-2-p. (DA 36-039-sc-87174) ASTIA
AD-261 711.

Report of efforts to detail an adaptive system. A subclass of such systems was selected and its functions analyzed.

98. Miller, G. A.
Decision units in the perception of speech.
IRE TRANS. INFORMATION THEORY, IT-8:
81-83, Feb. 1962.

Decisions relative to speech recognition depend upon grammatical structure, and it may be necessary to include such information for automatic speech recognition.

99. Minot, O. N.
AUTOMATIC DEVICES FOR RECOGNITION OF
VISIBLE TWO-DIMENSIONAL PATTERNS: A
SURVEY OF THE FIELD. Report for Jan 58 - May 59,
13 June 1961, 60p. Research Report no. 1050,
PB181065.

Survey of existent systems for recognition of two-dimensional visible patterns; and of the general principles involved.

100. Minsky, M. L., C. N. Pryor, and P. A. Clavier
"Self-educating" pattern-recognition schemes.
PROC. IRE, 50: 1707-1708, July 1962.

Letters on the title subject.

101. Minsky, M. L.
Steps towards artificial intelligence.
PROC. IRE, 49: 8-30, Jan 1961.

A survey of the problems of using artificial intelligence to solve really difficult problems. The report consists of the following five section: Search, pattern recognition, learning, planning, and induction.

102. Newman, E. A.
Some comments on character recognition
COMPUTER J. 4: 114-120, July 1961.

102. (contd). Systems should be organized, when possible, without pattern recognition because of complexity and expense. Character recognition systems should be constructed according to minimal distinguishing features that are similar to those used by humans.

103. Nikolayeva, T. M.
CLASSIFICATION OF A TABLE OF RUSSIAN
GRAPHEMES (ON THE PROBLEM OF BUILD-
ING A READING DEVICE). Joint Publications
Research Service, Washington, D. C. JPRS-
13256, March 1962. (Foreign Developments in
Machine Translation and Information Process-
ing, no. 88). (Translated from: Doklady na
konferentsii po obrabotke informatsii, mashin-
nomu perevodu i avtomaticheskomu chteniya
teksta. Moscow, Institut Nauchnoy Informatsii,
Akad, nauk, SSSR, no. 6, 1961, p 1-11)

On classificatory features of the Cyrillic alphabet for pattern recognition. Contains a number of references to Russian literature on the subject.

104. O'Connell, J. A.
Electroluminescent-photoconductive pattern
recognizer organizes itself. ELECTRONICS,
34: 54-57, July 14, 1961.

A sandwich module for recognition of 12-bit digital words is described.

105. Optical character reading at NCR
DATAMATION 7 (3):28, Mar. 1961.

Announcement of a National Cash Register character recognition machine that is capable of reading cash register tapes at 11,000 characters per second. Other generalities are discussed.

106. Optical recognition; the breakthrough is here.
DATAMATION 7(3): 22-23, 1961.

Report on activities of the ASA subcommittee on character recognition standards.
Eight criteria for judging type fonts have been established.

107. Optical scanners speed data processing.
INTERNATIONAL ELECTRONICS, 4: 22-25,
Aug 1962.

A general discussion of optical character recognition illustrated with some available equipment.

108. Optical scanning systems. AUTOMATIC
DATA PROC. 3 (3): 33-38, 1961.

A review of optical reader equipment available in Great Britain.

109. Partridge, E. M.
A linear vector recognition function. IRE TRANS.
ELECTRONIC COMPUTERS. EC-11:88, Feb. 1962.

Letter suggesting simplifications in computations for pattern recognition methods.

110. Reid, C. M. B.
A reader for hand-marked documents.
ELEC. ENGRG. 33:274-278, May 1961.

The logical operations are given in detail, and the component designs are described for a simple machine to read hand-marked documents.

111. Reistad, D. L.
BANKING AUTOMATION AND THE MAG-
NETIC INK CHARACTER RECOGNITION
PROGRAM. Detroit, Mich., Detroit Research
Institute, 1961, 173p.

The many practical aspects of the use of character recognition in banking procedures are discussed.

112. Reumerman, T. and W. H. T. Helmig
CHARACTER RECOGNITION, B. P.
895789, 9 May 1962.

Character recognition is achieved by the pattern of linear interruption detected by scanning elements.

113. Scope Inc. SPEECH RECOGNITION.
U. S. P. 3037076, 29 May 1962.

Digital signals from a converter of speech-to-digital are further converted to analog for optical comparison with stored patterns.

114. Scope Inc., SPEECH-TO-DIGITAL CONVERTER.
U. S. P. 3037077, 29 May 1962.

Spoken words are converted to digital form by a system that converts sound to light patterns.

115. Sebestyen, G. S. and Alice K. Hartley
STUDY PROGRAM OF PATTERN RECOGNITION
RESEARCH. Litton Systems, Inc., Waltham, Mass.
Final rept., 1 Jan - 31 Dec 61, 31 Dec. 61, 142p.
(Contract AF 19(604)8024, Proj. 5632) AFCRL
62-65. ASTIA AD-273 235

The basic element in pattern recognition problems is a requirement to recognize membership in classes. This analysis considers the automatic establishment of decision criteria for measuring membership in classes that are known only from a finite set of samples. Each sample is represented by a point in a suitably chosen, finite-dimensional vector space in which a class corresponds to a domain that contains its samples. Boundaries of the domain in the vector space can be expressed analytically with the aid of transformations that cluster samples of a class and separate classes from one another. From these geometrical notions a generalized discriminant analysis is developed which, as the sample size goes to infinity, leads to decision-making that is consistent with the results of statistical decision theory.

116. Sholtz, P. N. and R. Bakis
Spoken digit recognition using vowel-consonant
segmentation. ACOUST. SOC. AMER. J.
34:1-5, 1962.

Computer simulation is used to recognize spoken digits by segmentation of spoken words into vowels and consonants. From segmentation, recognition is performed by dictionary search. 493 words were tested with 50 speakers, and 97% of words were recognized.

117. Shoup, J. E.
Phoneme selection for studies in automatic
speech recognition. ACOUSTICAL SOC. OF
AMER. J. 34: 397-403, 1962.

Study of the phoneme alone as the fundamental criterion in speech recognition, and examination of the alternative of combinations of phonemes into words.

118. Singer, J. R.
Electronic analog of the human recognition system.
J. OPT. SOC. AM., 51: 61-69, Jan. 1961.

A system with many similarities to human characteristics is described. It will tolerate various sizes and degrees of tilt.

119. Singer, J. R.
A self organizing recognition system. In
WESTERN JOINT COMPUTER CONFERENCE,
1961, PROC. [New York], 1961, p. 545-69.

Input patterns from a matrix array of photoreceptors are compared with patterns in the memory. The worst fit in a comparison is retained if it does not overlap with another character. In this way considerable variation is allowed in the input forms.

120. Solartron Electronic Group Ltd.,
CHARACTER RECOGNITION. B. P. 860568,
8 Feb. 1961

A means of using several readers in different locations with one pattern recognition system.

121. Standard Telephones & Cables Ltd.
CHARACTER RECOGNITION. B. P.
858374, 11 Jan 1961.

On circuit connections for recognition systems using resistance matrices.

122. Standard Telephones & Cables Ltd.
CHARACTER RECOGNITION. B. P.
871162 and 871163, 21 June 1961.

These two patents describe a means of storing signals produced by scanning, in a two-dimensional shaft register where they are evaluated.

123. Standard Telephones & Cables Ltd.
CHARACTER RECOGNITION. B. P.
878931, 4 Oct. 1961.

Bistable devices couple signals obtained by parallel scanners and interpret any particular pattern with a character.

124. Steck, G. P.
Stochastic model for the Browning-Bledsoe
pattern recognition scheme. IRE TRANS.
ELECTRONIC COMPUTERS, EC-11,
274-282, April 1962.

The Browning-Bledsoe scheme for pattern recognition is analyzed by means of a stochastic model, in which successful probability of recognition is given as a function of scheme parameters and pattern variability parameters.

125. Stevens, M. E.
Abstract shape recognition by machine. In EASTERN
JOINT COMPUTER CONFERENCE 1961, PROC.
N. Y., Amer. Inst. Elect. Eng., 1961, p. 332-351.

The ability of machines to recognize several categories of geometric shapes is investigated relative to the problem of information selection and retrieval.

126. Stevens, Mary E.
AUTOMATIC CHARACTER RECOGNITION,
A STATE-OF-THE-ART REPORT. Natl. Bur.
Standards Tech. Note 112, May 1961, 168p.
PB 161613.

A comprehensive survey of the literature on pattern recognition with generalizations and analysis. Contains a bibliography of 549 references.

127. Stone, V. W.
Optical character recognition applied to phono-
typy. DATA PROC. 3(8): 38-42, 1961.

A concise description is given of the stenotype alphabet, and it is proposed that the computer type out words in full as the stenotypist codes into syllables.

128. Suzuki, H. and J. Oizumi
A PROGRAM FOR SPEECH RECOGNITION WITH
LEARNING ABILITY. Professional Group on
Information Theory of the Institute of Electrical
Communication Engineers of Japan, Fujimicho,
Chiyodaku, Tokyo, Japan. June 23, 1961.

Unknown speech signals are frequency-analyzed and transformed into 10-digit binary codes, and fed into the computer. Comparisons and decisions are made, and the output is evaluated automatically.

129. Sylvania Electric Products, Inc., Waltham, Mass.
OPTIMUM SPEECH SIGNAL MAPPING TECHNIQUES.
Final technical rept. 10 Jan 62, 94p. Rept. no. F428-1
(Contract AF 30(602)2446) RADC TR 62-3, ASTIA AD-
273 443.

Investigations of the analysis of speech and speech-like waveforms in terms of an exponential orthogonal function series were carried out. The analysis and resynthesis of speech was accomplished with a digital computer. Connected speech consisting of two spoken sentences was successfully analyzed and resynthesized using the methods advocated and developed. The resynthesized speech is of such quality that both the phonetic information and the identity and quality of the speaker's voice

are preserved. Thus the developed analysis methods appear to have significant relevance to future application in the analysis of speech for both automatic speech recognition machines and for speech compression communications channels.

130. Thompson Ramo Wooldridge, Inc. , Canoga Park,
Calif. WORD SEARCHING DEVICE, PART II. ,
23 Sept 1961, 49p. Tech. rept. no C117-1U14,
pt. 2. (AF 30(602)2300). ASTIA AD-264 440.

Work toward recognition of complete words is less attractive than letter by letter. The system for achieving the latter is presented.

131. Tuffill, H. W.
A note on recognition of hand-printed characters.
INFORMATION & CONTROL 4: 197, Sept. 1961.

Error rates in human recognition of printed characters have varied in various studies, and this note discusses the discrepancies.

132. Uhr, L.
A possibly misleading conclusion as to the
inferiority of one method for pattern recognition
to a second method to which it is guaranteed to be
superior. IRE TRANS. ELECTRONIC COMPUTERS,
EC-10: 96-97, March 1961.

A critical letter on tests of pattern recognition methods of Bledsoe and Browning by Highleyman and Kamentzky.

133. Uhr, L. and C. Vossler
A pattern recognition program that generates,
evaluates and adjusts its own operators. In
WESTERN JOINT COMPUTER CONFERENCE,
1961, PROC. [New York,] 1961, p. 555-69.

133. (contd) Description of a program that generates its own operators from unknown patterns in the form of binary matrices. Comparisons are made, and input correctly identified are amplified while others are deamplified.

134. Uhr, L. and C. Vossler
 Suggestions for self-adapting computer models
 of brain functions. BEHAVIORAL SCIENCE,
 6: 91-97, Jan 1961.

A general purpose computer system is described that would be self-adaptive with easily designed circuitry for operating on any kind of space.

135. Vogler, G. W.
 Optical scanning of customer accounts.
 DATAMATION 7(3): 26, March 1961.

Description of the operation of a system for scanning numerical data on bill stubs and transcribing same to paper tape for processing. Reading rate is 100 documents per minute.

136. Vessler, C. and L. Uhr
 COMPUTER SIMULATIONS OF A PERCEPTUAL
 LEARNING MODEL FOR SENSORY PATTERN
 RECOGNITION, CONCEPT FORMATION, AND
 SYMBOL TRANSFORMATION, System Develop-
 ment Corp., Santa Monica, Calif. 8 Mar 62, 14p.
 Rept. no. SP-562. ASTIA AD-276 703

137. Watanabe, S.
 A note on the formation of concept and of associa-
 tion by information-theoretical correlation analysis.
 INFORMATION & CONTROL, 4: 291-296, Sept 1961.

The method of information-theoretical correlation analysis provides a powerful tool in producing mechanisable models of certain cognitive and recognitive processes. All kinds of correlation can be added on an equal footing to form the total sum of correlation, which is a constant and characteristic of a given set of objects.

138. Weeks, R. W.
Rotating raster character recognition system.
COMMUN. & ELECTRONICS, No. 56: 353-359,
Sept. 1961.

The procedure for applying statistical decision theory to a rotating raster character recognition system is described. Results of simulations are given, and an outline is presented of a design for a completely transistorised system.

139. Welch, P. D. and R. S. Wimpres
Two multivariate statistical computer programs
and their application to the vowel recognition
problem. J. ACOUST. SOC. AM., 33:426-434,
April 1961.

Two systems based upon multivariate statistical techniques for vowel recognition are described.

140. Wentworth, V.
Farrington has optical scanning lead.
DATAMATION 7, (3):23-25, Mar. 1961.

Procedures are discussed concerning the use of Farrington Electronics, Inc. apparatus in billing.

CATCHWORD
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